IV. SOCIAL PROBLEMS OF MODERN SOCIETY
IV. СОЦИАЛЬНЫЕ ПРОБЛЕМЫ СОВРЕМЕННОГО ОБЩЕСТВА

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AUTO VEHICLES EFFECT ON SVERDLOVSK REGION ENVIRONMENTAL SITUATION

Abstract. *The article studies the distribution of the pollutants volume resulting from the vehicles total complex, throughout the 2017. Sverdlovsk region has also experienced the harmful effects. The article does the analysis of the 3 types of vehicles in the Sverdlovsk region in the period 2010-1019. The dynamics of emissions into the air has also been studied. The major emphasis is given to such pollutants as carbon monoxide, nitrogen oxide and volatile organic substances.*

Keywords: *vehicles, environment, Sverdlovsk region, passenger cars, exhaust gases, pollutants.*

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ВЛИЯНИЕ АВТОТРАНСПОРТА НА ОКРУЖАЮЩУЮ СРЕДУ СВЕРДЛОВСКОЙ ОБЛАСТИ

Аннотация: *В данной статье рассматривается распределение объема выбросов загрязняющих веществ от автотранспортного комплекса в разрезе федеральных округов за 2017г. Свердловская область также ощущает негативное воздействие. Произведен сравнительный анализ численности 3 типов АТС Свердловской области с 2010 по 2019 год. Здесь же исследована динамика выбросов автомобилей в атмосферный воздух УрФО за последние 5 лет. Основное внимание уделяется выбросам таких веществ, как оксид углерода, оксид азота и летучие органические вещества.*

Ключевые слова: *автотранспорт, окружающая среда, Свердловская область, легковые автомобили, отработавшие газы, загрязняющие вещества.*

This study analyses the dynamics of the vehicles exhaust contents into the air. The biggest volume from moving sources was observed in 2017 in the Central Federal district, including 26.2% of the total [1]. The Ural Federal district takes the 2nd place, as in 2017 the exhaust volume was 2937.5 thousand tons or 20% from all-Russian total.

Sverdlovsk region, being a subject of the RF, experiences the vehicles negative impact as well. According to the analytical agency «Avtostat», the number of vehicles per capita is bigger than in Moscow or Kazan [2]. As to the 2nd of July 2020 over 465.5 thousand vehicles have been registered. The permanent population at that being a little over 1.5 million. Thus, there are about 305 vehicles per very thousand of city-dwellers. The mentioned indicator for Yekaterinburg exceeds the capital of Russia, which has the greatest number of population and the biggest car park (there are 287 passenger vehicles per every thousand people in Moscow).

Table 1 shows the growing number of vehicles used within the Sverdlovsk region.

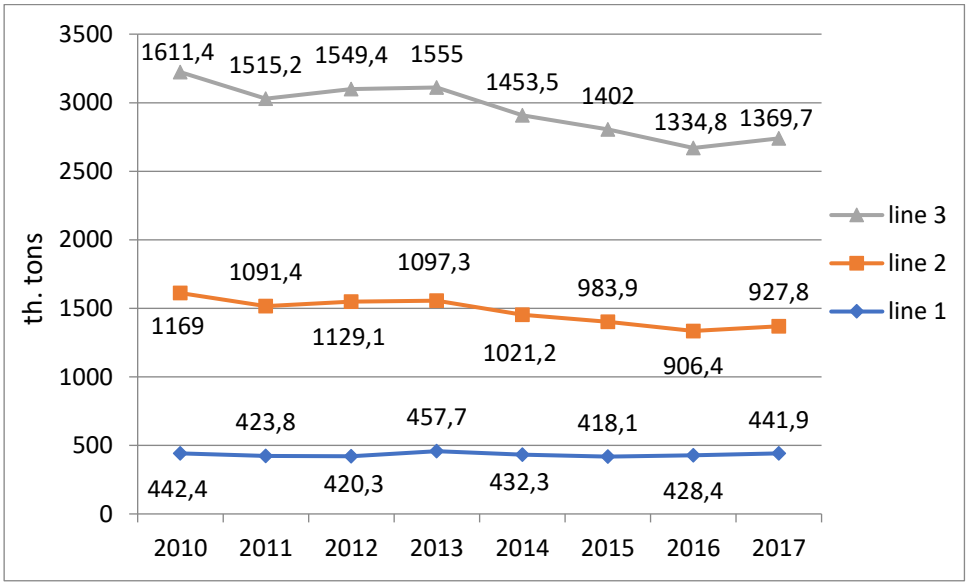
Table 1. The changing number of vehicles registered on the territory of Sverdlovsk region, in thousands of units

Vehicle type	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019
Passenger cars	1230,86	1280,41	1364,14	1401,35	1441,26	1591,96	1 627,80	1 675,48	1 733,64	1 790,94

Cargo cars	154,38	155,35	180,99	199,50	194,28	208,65	2120,49	217,48	222,53	227,67
Buses	24,92	23,19	23,78	21,83	21,28	22,52	23,01	23,83	24,62	25,13
Total	1410,15*	1458,94*	1 568,91*	1 622,68*	1 656,82*	1 823,13*	1 863,31*	1 916,80*	2 109,41*	2 178,50*

* Excluding trailers and motor vehicles

As of 2019 there are about 1791 thousand units of passenger cars, over 227.5 units of cargo cars and over 25 thousand units of buses [3]. As can be seen from the table, on average, the number of passenger cars grows by 4.28% a year, cargo cars by 2.85% and buses by 0.04%. In the period of 9 years (2010-2019) the total number of vehicles has grown 1.5 times. Due to growing vehicle number, the positive dynamics of pollutants exhaust can be observed.



Source: Rosstat, Rosprirodnadzor data

Fig.1 - Pollutants exhausts from vehicles and from stationary emission sources in Sverdlovsk region (th.tons), 2010-2017, line 1 – vehicles exhausts, line 2 – stationary sources exhausts, line 3 – vehicles and stationary sources exhausts summarized.

The total volume of pollutants emissions in 2017 has changed insignificantly (within the limit of 17.7%). However, starting from 2012 a redistribution of emissions has taken place: the emissions volume from stationary emissions sources has grown by 3.5%, from mobile sources has reduced by 0.8%. On the whole a positive dynamic in vehicle emissions in Sverdlovsk region can be observed, which also has a wavelike

character, explained by economic and political factors. A sharp shift to a decrease in vehicle emissions took place in the period 2013-2015, after which since 2016 a steady growth in pollutants emissions has been going on. As can be seen in fig.1, the vehicles impact in 2015-2017 has increased by 6%.

Vehicles have a huge effect on Yekaterinburg atmospheric pollution. Emissions by vehicles have a number of differences from those of stationary emissions sources:

1) First, exhaust gases enter the human respiratory system immediately;
2) Second, vehicles are numerous mobile emissions sources;
3) Third, vehicles concentrate in cities etc. [4].

Thus, cities with high numbers of vehicles become risk zones for irreversible health loss due to mixture of carbon dioxides, nitrogen, sulfur dioxide, volatile hydrocarbons, soot, lead compounds and many other components.

Table 2. Dynamics of main pollutants emissions from vehicles in the Ural Federal district 2014-2018, th.tons

Year	Total	Carbon monoxide	Volatile organic compounds	Nitrogen oxides	Solid particles(soot)	Sulfur dioxide
2014	1267,30	977,20	129,60	142,10	2,40	7,40
2016	1280	986,90	130,60	143,90	2,50	7,50
2017	1315,30	1014,10	134,20	147,90	2,60	7,80
2018	1512,60	1166,20	154,50	169,90	3,00	8,90

Source: Rosprirodnadzor data

The data in Table 2 [5] show the emissions from vehicles in 2018 in the Ural Federal district were 1512.6 th.tons and had increased by 245.3 th.tons (19.4%) in reference to 2014 due to growth in vehicles number.

The main share in total pollutants emissions caused by vehicles are taken by carbon monoxide (77.1%), nitrogen oxides (11.2%), and volatile organic compounds (10.2%) (fig.2).

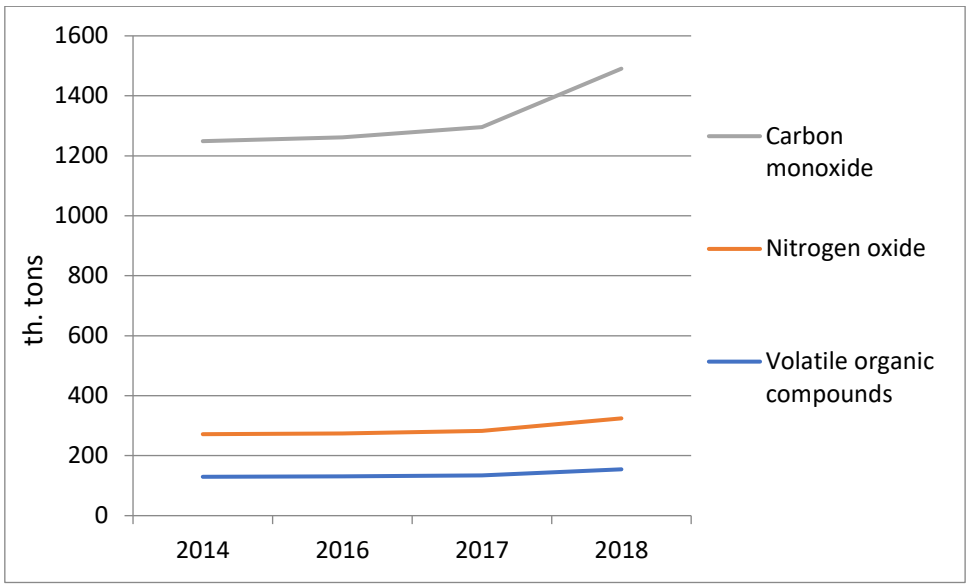


Fig.2 - Emissions of carbon monoxide (II), nitrogen oxide (IV), and volatile organic compounds from vehicles in the Ural Federal district.

In the last 5 years the issue of vehicle emissions has grown out if scale. Apart from that, vehicles are a major source of noise pollution, thermal pollution, production of rubber and asbestos containing dust as a result of tires and brake linings exploitation. The issue of vehicle safe keeping and parking is an acute one. Streets are overflooded with vehicles, which causes accidents. It's time measures were taken to improve the situation in Sverdlovsk region.

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